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Notice of Allowability

Application No.

10/034,305

Examiner

Tuan V. Thai

Applicant(s)

MARTIN, MARCIA REID

Art Unit

2186

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

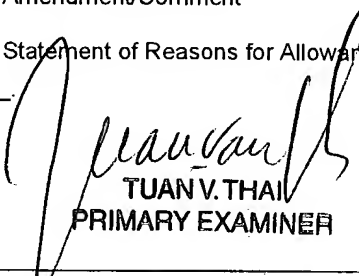
1. ☒ This communication is responsive to amendment filed 07/26/04 and Examiner interview conducted on August 19, 2004.
2. ☒ The allowed claim(s) is/are 1-4, 6-15, 17-22, 26, 28, 31-33, 35-38, 40 and 42-44 renumbered as 1-10, 13-16, 18-23, 11, 17, 25-27, 31-32, 28-30, 33, 12 and 24 respectively.
3. ☒ The drawings filed on 16 April 2002 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
- * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____


TUAN V. THAI
PRIMARY EXAMINER

Application/Control Number: 10/034,305

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Attorney's Docket No.: 2001-054-SFT

IN THE UNITED STATES PATENT AND
TRADEMARK OFFICE

In re application of: Marcia Reid Martin Group: 2186
Serial No.: 10/034,305 Examiner: Tuan
Thai
For: DATA MANAGEMENT APPLIANCE.

EXAMINER'S AMENDMENT

1. An Examiner's Amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 C.F.R. § 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the Issue Fee.

2. Authorization for this Examiner's Amendment was given in a telephone interview with Mr. Timothy R. Schultz; Reg. No. 29,013 on August 19, 2004

3. The application has been amended as follows:

In the claims:

- a. Cancel claims 16, 27, 30, 34, 39 and 41.
- b. Please amend claims 12, 28, 32, 37-38 and 40 as follows:

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Claim 12. (Amended) A data management appliance, comprising: a random-access storage unit; and

control circuitry adapted to receive commands from a computer system,

wherein in response to the control circuitry receiving a write command from the computer system, the control circuitry updates the random-access storage unit to include information associated with the write command;

in response to a mount command including a time value, the control circuitry configures itself to perform future read operations with respect to a fixed time represented by the time value; and

in response to a read command including a logical address, the control circuitry retrieves, from the random-access storage unit, data representing contents of the logical address at the fixed time[.];

wherein the random-access storage unit stores a forward journal, and commands stored in the forward journal are combined to obtain a net change,

wherein a mirror-in-the-middle is updated to reflect the net change.

Claim 28. (Amended) The data management appliance of claim [27]

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12, wherein starting address and lengths associated with the net change are used to derive an inverse of the net change.

Claim 32. (Amended) A method of replicating data written to a data storage system, the method comprising:

creating a mirror-in-the middle (MIM) recording an exact copy of the data storage system at a fixed point in time;

recording a forward journal holding write events received since the fixed point in time;

receiving a request to access replicated data as the replicated data existed at a requested time, the requested time more recent than the fixed point in time; and

constructing a virtual recovery mapping object (VRMO) from the forward journal based on the requested time, the VRMO translating received logical addresses representing locations on the data storage system to physical locations of the replicated data, the VRMO implemented in a random access structure, the VRMO referencing replicated data as a copy of data written to the data storage system since the fixed point in time[.]; wherein the random access structure is a multi-way search tree;

producing a plurality of snapshots from forward journal entries, the plurality of snapshots reflecting changes in the data storage system overtime;

storing the plurality of snapshots in a backward journal;

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creating backward journal entries based on the VRMO and entries in the forward journal; and
producing a new snapshot based on the backward journal entries and the VRMO.

Claim 37. (Amended) The method of replicating data as in claim [34] 32 wherein the request to access replicated data is a read request.

Claim 38. (Amended) The method of replicating data as in claim [34] 32 wherein the request to access replicated data is a mount request.

Claim 40. (Amended) The method of replicating data as in claim [39] 32 further comprising: updating the MIM as each snapshot is produced; discarding forward journal entries used to update the MIM; and updating the fixed point in time.

REASONS FOR ALLOWANCE

4. The following is an Examiner's Statement of Reasons for Allowance:

The prior arts of record do not teach nor suggest, *either alone or in combination*, all the limitations of the claimed

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invention (claims 1, 12, 31 and 32), particularly apparatus and method for replicating data written to a data storage system comprises a random-access storage unit, a control circuitry which receives commands from a host computer system, wherein in response to the control circuitry receiving a write command from the computer system, the control circuitry updates the random-access storage unit to include information associated with the write command and in response to a read command including a logical address and a time value, the control circuitry retrieves, from the random-access storage unit, data representing contents of the logical address at a time represented by time value; particularly, the prior art of record do not teach the control circuit combining the commands to obtain a net change, deriving an inverse of the net change based on a starting address and lengths associated with the net change, the inverse of the net change recorded as a snapshot in the backward journal.

In light of the foregoing the claims of the present application are found to be patentable over the prior art.

Claims 2-4, 6-11, 13-22, 26-28, 30, 33-44 further limit the allowable independent claims. These claims are therefore allowable for the same reason as set forth above.

Any comments considered necessary by Applicant must be submitted no later than the payment of the Issue Fee and, to avoid processing delays, should preferably **accompany** the Issue

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Fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan V. Thai whose telephone number is (703) 305-3842. The examiner can normally be reached on from 6:30 A.M. to 4:00 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mathew M. Kim can be reached on (703)-305-3821. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TVT/August 20, 2004

Tuan V. Thai

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PRIMARY EXAMINER
Group 2100